THE DIET OF RAINBOW TROUT IN WUNGONG DAM, WESTERN AUSTRALIA

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ABSTRACT

The stomach contents of 42 adult Rainbow Trout *(Salmo gairdneri)*, collected over a twelve month period, were examined. Of these, 35 were found to contain some food. Freshwater crayfish were the most important item by weight (80%) and occurred in 37% of all stomachs examined. The majority of insects contributing to the diet were terrestrial in origin, with Coleoptera the most important in terms of both weight and frequency of incidence. Native fishes and frogs were also present in the diet.

INTRODUCTION

Rainbow trout, *Salmo gairdneri*, were first introduced to Western Australia in 1930 (Fraser 1952) and subsequent stocking of hatchery-raised fry and eyed-ova has enlarged their distribution to include many of the large dams and rivers of the south-west of Western Australia. Very little is known about the impact of this species on the native fish fauna of Western Australia, in contrast to the large amount of information amassed in the eastern states of Australia and in New Zealand on the effects of this and other exotic fish species. Numerous studies have shown that trout have eliminated or at least strongly affected native fish populations, especially those of the Galaxiidae (Frankenberg 1966; McDowall 1968; Cadwallader 1975: Tilzey 1976: Jackson and Williams 1980).

The only published information on the diet of trout in Western Australia is that of Jenkins (1952) and is based on a small sample size. Jenkins *(op. cit.)* stressed the need for further research in this state ostensibly to solve the problem of trout acclimatization but also to determine the effect of this species on the natural environment.

METHODS

Adult trout were collected by gill netting (mesh size — 10 cm) in the Wungong Dam, 35 km south-east of Perth. This reservoir is for domestic supply and is vested in the Water Authority of Western Australia. It has a surface area of approximately 8.4 km^2 and an average depth of 35 metres. The dam is fed by five streams, the largest of which is Wungong Brook.

Nets were set in about 5 metres of water in the early evening and checked after four hours. The stomachs of trout caught during this period were removed and preserved in 4% formalin.

Stomach contents were sorted in the laboratory and food items identified and weighed. Insects were identified to family only where it was necessary to distinguish between terrestrial and aquatic representatives. Crustaceans, fishes and amphibians were identified to generic or specific level. The

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frequency of incidence and the proportion by wet weight were estimated for each food item from only those stomachs that contained food.

RESULTS AND DISCUSSION

A total of 42 fish, 35 of which had stomachs containing food, were collected throughout the study period (October 1985-October 1986). Table 1 indicates that the marron *(Cherax tenuimanus)* was by weight, the most important food item and was present in over one third of all stomachs examined. A similarly high proportion of freshwater crayfish has been described for the diet of trout in N.S.W. (Pidgeon 1981). Other crustaceans contributed little to the diet in terms of weight, yet it is interesting to note the high frequency of incidence of *Cladocera* in the diet. One fish contained over 1000 individuals and the weight contribution was 16.5%. Other items in the same fish included beetles, an adult fish and a frog over 10 cm in length.

Table 1. The frequency of incidence and the proportion by weight of items in the diet of Rainbow Trout in Wungong Dam.

Prey item	Frequency of incidence (%)	Proportion by weight (%)
CRUSTACEA		
Parastacidae: *Cherax tenuimanus*	37.1	79.6
Palaemonidae: *Palaemonetes australis*	2.9	0.02
Daphniidae	14.3	1.4
INSECTA		
Coleoptera	42.9	7.3
Hemiptera	34.3	0.7
Hymenoptera	14.3	0.2
Isoptera	11.4	0.8
Odonata (nymph)	5.8	0.04
(adult)	2.9	0.03
Lepidoptera	2.9	0.04
Blattodea	2.9	0.01
PISCES		
Edelia vittata	28.6	3.4
Galaxias occidentalis	2.9	0.03
Gambusia affinis	2.9	0.05
ANURA		
Litoria sp.	8.6	4.1
VEGETABLE MATTER	14.3	2.3

Insects were the most frequently eaten food item and contributed 9.12% to the total diet by weight. Of this contribution 73% was comprised of terrestrial insects. Beetles were the most important item by weight and frequency of incidence but termites were the most numerically abundant insect and contributed 42.7% of the total number of insects examined (159 of 372). Termites were present in the diet in October and December 1985 only (n=11), corresponding to periods of annual emergence and dispersal typical of termites at this time of year (Gay 1970). The pattern of appearence of insects in the diet reflects the foraging nature of trout in the

dam. The level of diversity of insects within the stomach of a particular fish was generally low, i.e. it was usually all beetles, ants or bees of one species.

Native fishes were the fourth most common item in the diet. The Pygmy Perch, *Edelia vittata* was the most common of these. Where a perch occurred in a stomach, in all but one case a number of other perch were also present. Predation of native fishes by trout has not been previously documented in Western Australia although Jenkins (1952) does record the presence of small fish bones in the stomach of one individual from Treen Brook, Pemberton.

Trout may affect native fish species by exploitation competition as well as by predation. The Western minnow, *Galaxias occidentalis* feeds almost exclusively on terrestrial insects, as does *Nannatherina balstoni* (Pusey unpublished data). *N. balstoni* does not occur in Wungong Dam but was or is present in other water bodies in which trout have been introduced. Competition between trout and pygmy perch does not appear to be important when considered relative to the pressure of predation. However, unpublished information of the diet of two juvenile trout from the North Dandalup River (standard lengths of 58 and 73 mm) suggests that the diet of juvenile trout is similar to that of *E. vittata*, i.e. chironomid larvae and pupae, culicid larvae and Trichoptera (Pusey unpublished data). Marron are an important food source for freshwater cobbler in Wungong Dam and this species may potentially compete with trout (Morrison unpublished data).

The inclusion of tree frogs in the diet is of interest as two of the three frogs contained mature ova and one of the stomachs examined contained both a male and a female frog. The species, most probably *Litoria adelaidensis*, is dependent on free water only during its breeding season and it is possible that these frogs were ingested at the time of amplexus or oviposition.

ACKNOWLEDGEMENTS

We wish to express our thanks to the Water Authority of Western Australia for permission to collect trout in Wungong Dam. Thanks are also extended to Don Edward, Peter Davies and Andrew Storey of the Zoology Department Aquatic Research Laboratory for critical examination of the manuscript.

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THE AMPHIBIA, REPTILE AND MAMMAL FAUNA OF THE MURRAY — SERPENTINE RIVER DELTA, SOUTH WEST, WESTERN AUSTRALIA

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INTRODUCTION

The Murray — Serpentine River delta (32° 34' 50"S. lat. 115° 46' 00"E long.) is located 110km south of Perth. The eight islands in the delta (Figure 1) make a total area of approximately 400 hectares and are all vested in the Shire of Murray as a "National Park" (1932). Over the last 20 years the Western Australian Naturalists' Club has conducted a number of excursions to the area recording natural history data. The only published information are Serventy (1970) and Hutchison (1972). Because of the lack of information on the terrestrial vertebrate fauna of this, the only typical, delta on the Western Australian coast we undertook a survey to determine the composition, relative abundance and habitat preferences of the various species. The climate of the delta system is characterised by hot dry summers and cool wet winters (McArthur and Bartle 1980). The nearest climatic data is available from Mandurah which is approximately 8km north-west, where the mean annual rainfall is 891mm and the mean maximum and minimum temperatures are 23° and 12°C. respectively. The coastal plain has wet winters that can cause extensive inundations on the islands forcing some components of the terrestrial fauna to move to higher areas or perish. However, in dry summers all areas are readily accessible.

METHODS

Mammals, amphibians and reptiles were collected on the delta islands during 1986 on a seasonal basis. Duration of these surveys were as follows: Summer: 14-17 February, Autumn: 20-27 April, Winter: 23-31 August, Spring: 22-28 November, Summer: 13-19 December.

Mammals were sampled by the use of elliott and cage traps and by observations and talking to local residents. Collecting of amphibians and reptiles involved active searching during day time, turning over surface debris, raking through leaflitter and headtorching at night for nocturnal species. Appendix III shows the number of species recorded on each island.